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Published in:
Evaluation and Program Planning

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version
Publisher's PDF, also known as Version of record

Publication date:
2002

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):

van Maanen, H., & Berghout, E. W. (2002). Cost management of IT beyond cost of ownership models: a state of the art overview of the Dutch financial services industry. *Evaluation and Program Planning*, 25(2), 167-173. [PII S0149-7189(02)00010-1].

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Cost management of IT beyond cost of ownership models: a state of the art overview of the Dutch financial services industry

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Abstract

Controlling costs is an essential part of a value driven information technology (IT) management. This paper gives a state of the art overview of IT cost management practice. Both theoretical and an empirical approach are taken. The theoretical approach is based on both general accounting literature and a study of comprehensive and total cost of ownership models as propagated by various consultants. IT cost management in practice is studied through case studies at IT departments in 10 major financial services companies in the Netherlands. © 2002 Elsevier Science Ltd. All rights reserved.

Keywords: Cost management; Benchmarks; Information technology

1. Introduction

Cost management of information technology (IT) exists since the early days of computers (Bannister & McCabe, 1999). Given this amount of time, one might expect that the area of cost management would be well established. Profound knowledge of IT costs is in any case necessary in order to value and evaluate IT.

The study described in this paper provides a state of the art overview of IT cost management. Both theory and practice are analysed. The analysis of theory is based on general accounting literature and cost of ownership models as propagated by various consultants. IT cost management in practice is studied through case studies at IT departments in 10 major financial services companies.

Most concepts regarding IT cost management are not uniquely defined. For example, costs may refer to cash flows or the accounting registration of costs. In this paper costs are defined as:

...the financial representation of the sacrifices an organisation makes in order to produce.

Applying this definition, implies that buying a computer is an expense, not a cost. Using this computer in day-to-day business implies a value depreciation and consequently

costs. Costs are always estimated under ‘normal’ business conditions in order to differentiate between incidents and allow an optimal organisational decision-making.

The outline of this paper is the following. First, an overview is given about cost management and the cost of ownership models. Second, cost management of information technology is analysed at 10 major financial services companies. Third, the empirical findings are analysed in more detail. The article ends with a summary and conclusions.

2. IT cost management theory

In this section an overview is given about cost management literature and total cost of ownership models (TCO) in particular. Given the fact that most of the targeted audience of this paper is knowledgeable in the area of accounting, this section will be focussed on the various TCO models and include accounting literature when appropriate.

TCO is a term that is frequently used in IT cost management literature, although often with different meanings and definitions. Most of the times the term TCO applies either to the costs of an information system or to the IT costs of an organisational-unit. The TCO of an information system is defined here as:

...all the costs associated with owning and using the information system throughout its life cycle.

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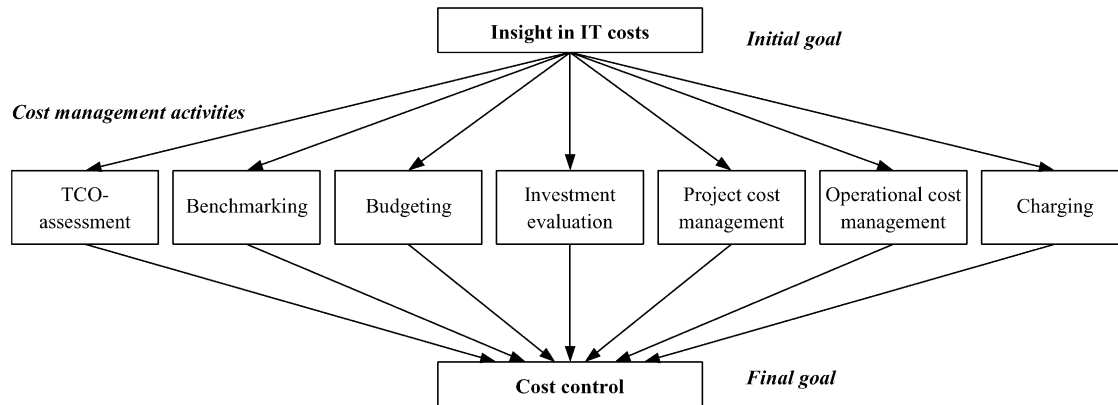


Fig. 1. Overview cost management activities.

The TCO of an organisation can be defined as:

...all the costs associated with owning and using IT by the organisation over a certain period of time.

TCO models force to consider IT expenditures beyond the initial investment i.e. throughout the life cycle of information systems. Furthermore, they predefine the cost categories and, consequently, avoid overseeing particular types of costs. The actual value, which is measured, depends on both the timeframe and the point of reference. For example, an IT organisation providing a certain information system will experience other costs and a different TCO value, than the individual business units using this system.

Over the years a number of models have been developed to measure TCO. These TCO models distinguish themselves from the general cost models because they consider *all* costs of a certain *IT object* (facility, system or component) over the *entire life cycle* of this object. In this theoretical study four distinct cost of ownership models have been analysed and compared:

- *Total Cost of Ownership model* of the Gartner Group (Redman, Kirwin, & Berg, 1998). This model focuses on benchmarking the total annual IT costs per client. It is characterised by a high level of detail and the fact that it takes unbudgeted (hidden) costs into account.
- *Cost of Network Ownership model* by Treacy (1989). This model provides a high-level framework designed to incorporate all the different costs of a computer network and divide them into categories. It takes into account costs associated with acquisition, operation and incremental change.
- *Real Cost of Ownership model* of the META Group, 1997. This model makes a clear distinction between IT costs directly associated with the acquisition and operation of IT on the one hand and 'line of business' costs caused by the use of IT on the other hand.
- *Workplace model* of the SURF scientific technical council (Looijen & van der Vorst, 1998). This model looks at the

costs of a single PC-workplace, by categorising the costs according to different levels of functionality.

The analysis showed that the design of a cost model is influenced by the scope of the model in terms of what (object), where (organisational-unit) and why (goal) the model is being applied. The four models look at different objects, being the IT costs of an organisation, network or workplace. The models can be applied within different types of organisational-units, although depending on the point of reference adjustments might be necessary. Also the effort needed to apply a detailed model, makes them less applicable for small organisations. The four models do share the same goal; to be able to assess the IT costs and benchmark these costs with data of similar organisations. The main differences in the designs of models are in the cost categories that are discerned, the level of detail that is used and the way 'hidden' costs are incorporated into the model. These so called hidden costs refer to non-budgeted costs that, for example, users make through helping each other by getting acquainted with a new information system.

As TCO models introduced the awareness to consider all the costs throughout the life cycle, the question arises as to how organisations can control these costs throughout the life cycle. Looking at cost management from a life cycle perspective, seven different cost management activities can be identified. These activities are:

- *TCO assessment*: assessing the IT costs of an organisation at a certain point of time.
- *Benchmarking*: comparing IT costs with other organisations.
- *Budgeting*: determining a budget for every separate organisational-unit.
- *Investment evaluation*: justifying and prioritising IT investment proposals.
- *Project cost management*: managing the costs of IT projects.
- *Operational cost management*: managing the costs of operational systems.

Case:	1	2	3	4	5	6	7	8	9	10
TCO assessment (workplace)	+								+	
External benchmarking	+	+		+	+					+
Direct comparison with competitors		+		+	+					
Internal benchmarking possible	+					+		+		

Fig. 2. Overview of TCO assessment and benchmarking in case studies.

- *Charging*: charging other departments for services provided by the IT organisation.

To be able to control the cost of IT, there is a need for IT cost models that provide insight into the costs of IT in such a way that they can support the different cost management activities. This is shown in Fig. 1.

The existing TCO models provide a framework that indeed provides insight into the IT costs of a single object. However, the models are primarily suitable for TCO-assessments and benchmarking. They could also provide a cost framework for investment evaluations, however, TCO models themselves provide obviously insufficient information for an investment appraisal.

To support the other cost management activities (i.e. budgeting, project cost management, operational cost management, and charging) a cost model should also provide insight into the distribution of costs over several calculation objects, for example, different organisational-units, projects, operational systems or services. The existing TCO models focus on one object at a time and do not provide insight into this distribution.

Another problem is the fact that the existing TCO models are generally used on an ad hoc basis, rather than in a continuous process of cost management. To be able to control the costs of IT projects and operational systems these costs have to be monitored on a regular basis.

It is concluded that existing cost of ownership models:

- Provide insight into the IT costs of a single object (information system or organisational-unit).
- Are applicable in TCO assessments and benchmarking.
- Do not support other cost management activities (i.e. budgeting, controlling project costs, controlling operational systems costs, and charging). These activities require insight into either the distribution of the costs over several objects or on a more continuous basis.

3. IT cost management practice

Which techniques are actually used in practice to manage IT costs? In this section a case study of 10 major financial services companies in The Netherlands is given. Each case study is based on an extensive interview with an IT manager or IT controller, supplemented by research of available documentation on their cost management practice. The use of TCO models is addressed in particular.

The case studies focus on the different cost management activities mentioned in the previous paragraph and in particular on the cost models used to perform these activities. In Section 4 the findings of this study will be described.

4. TCO assessment and benchmarking

The first question referred to the use of TCO assessments and benchmarking. The following observations were made. Assessment of the TCO of a workplace is only mentioned in two cases. Most of the benchmarks concern either the costs of data centres or systems development. These benchmarks do not only look at the costs, however also consider the effectiveness and the price/performance ratio. In five cases, the IT organisations benchmark their costs externally, comparing themselves to IT organisations in other companies. In three of these cases, this is done on a regular basis. In the same three cases, the organisations periodically compare a number of high-level metrics directly with a number of their competitors in the Dutch financial market. In three cases models have recently been developed that should make internal benchmarking possible between different IT organisations within the same company.

There is disagreement on whether the benchmarking activity is actually worthwhile. The added value is questioned, because of the high costs of particularly external benchmarking and the questionable influence on strategic and tactical decision-making.

Case:	1	2	3	4	5	6	7	8	9	10
External budget per client		+	+							
Budget per project	+			+	+	+	+			+
Internal budget per department	+		+	+			+	+		

Fig. 3. Overview of budgeting in case studies.

Case:	1	2	3	4	5	6	7	8	9	10
Standardised project proposal	+	+		+	+	+	+	+		
Estimation of investment costs		+	+	+	+	+	+	+	+	+
Estimation of exploitation costs		+			+	+		+		

Fig. 4. Overview of investment evaluation in case studies.

An overview of the findings regarding TCO assessment and benchmarking is given in Fig. 2 ('+' represents 'applies to this organisation').

5. Budgeting

Regarding budgeting the following observations were made. All IT organisations in this study make yearly budgets. Most of them estimate the costs per client, however, in two cases the client also receives actual freedom to spend this budget. Internally, most IT departments make budgets per project and for going concern activities. This is closely related to the fact that the project cost management and operational cost management are distinct activities in most IT departments. Some organisations make budgets per cost centre, i.e. organisational-unit. The number of budgets ranges from three internal departments in one case to over a hundred cost centres in another case (Fig. 3).

6. Investment evaluation

Regarding investment evaluation the following observations were made. Most IT investments get identified as IT projects. In seven cases, a standardised template of project proposals is used for evaluation. In nine cases, the evaluation process is a part of the yearly budgeting and planning process. Case 2 is the only organisation in which project proposals can be issued throughout the year. They want the IT department to be able to act whenever a business unit requires this.

All case study organisations require that project proposals contain estimates of the total costs of a project and on a number of other aspects such as benefits, risks, and project planning. It is remarkable that nine out of ten organisations require estimates on the total investment costs to be taken into account, however, only four organisations also include the yearly exploitation costs caused by the investment. Unfortunately, a proper evaluation of costs and benefits of

an investment is not possible without an estimate of the exploitation costs.

The world of IT is relatively new and volatile. A number of organisations in this study indicated that the lack of historic data and experience with IT makes it difficult for them to pre-calculate costs for budgeting and investment evaluation purposes. However, these organisations also do not seize the opportunity to collect this data on the existing projects and operational systems. An evaluation of a completed project remains exceptional (Fig. 4).

7. Project cost management

Regarding project cost management the following observations were made. Most organisations plan all IT projects on a yearly basis and report their progress on a 1, 2 or 3-monthly basis. An important cost driver and the most important reason for project delays is the availability of suitable personnel. Projects are often budgeted and monitored on the basis of number of personnel hours. In four cases, standardised hourly rates per staff function are used to translate these hours into costs. In three cases, the clients are made fully responsible for their projects. They do not only get charged for the project costs, they are also enabled to manage these costs, duration of their projects and final results. Project approvals are based on many assumptions. None of the organisations in this study explicitly evaluates whether these assumptions have been realised (Fig. 5).

8. Cost management of operational information systems

Regarding cost management of operational information systems the following observations were made. In six cases, the IT departments have insight into their operational costs on a monthly basis. Eight of them compare these costs with the budgeted costs on a monthly or quarterly basis. In seven cases, the IT departments use a general cost accounting model based on cost centres. They are primarily focussed

Case:	1	2	3	4	5	6	7	8	9	10
Monthly progress report				+	+		+			+
Standardised hourly rate	+			+				+		+
Client has final responsibility		+		+		+				

Fig. 5. Overview of project cost management in case studies.

Case:	1	2	3	4	5	6	7	8	9	10
Monthly insight in operational costs	+		+	+	+		+	+		
Periodic comparison cost vs. budget	+		+	+	+	+	+	+	+	
(Want to) use activity-based costing		+		+	+		+	+		

Fig. 6. Overview of cost management of operational systems in case studies.

on administrating and budgeting their own departmental costs. Consequently, information from the financial administration does not provide them the adequate management information to control their costs.

In two cases (2 and 5) a cost model is used based on activity-based costing (ABC). Three other organisations consider applying ABC in the future. In case 2, this model is used primarily for determining prices for cost charging purposes. In case 5, they use the ABC model for several different cost management activities, in an integrated approach to cost control. In case 3, the organisation has developed a new cost model that links the products and services of the IT department with the internal processes needed to deliver these services. This model is focused on operational cost management. The models used by these three organisations share the similar feature that they incorporate the different activities (internal processes) of the IT department into the model. These organisations consider their insight into their operational IT cost as adequate (Fig. 6).

9. Charging of costs

Regarding the charging of IT costs to other departments in the organisation the following observations were made. Nearly all IT departments in this study charge their costs to other departments. In case 3, a margin is added on top of the costs to support research and development activities. Some organisations prefer to work with standardised prices, others use the actual costs whenever possible. Several charging mechanisms are applied, for instance based on ownership, usage, a system specific distribution or a general distribution.

Many IT organisations in this study indicate that the other departments cannot relate the IT costs, which they are charged with, to their business processes. Therefore, they are unable to recognise whether the costs are actually worthwhile. Most user departments feel they are unable to influence the IT costs. A few IT organisations therefore

consider charging their clients per system or application instead of specifying all particular components. In most cases billing takes place every month (Fig. 7).

10. Administration

Regarding the administrative processes and systems the following observations were made. Information on IT costs and performance is often administered in several different administrations. For instance, there are different administrations concerning the costs of the IT department, projects, IT components (configuration management), mainframe volumes, time registration, etc.

Time management is an important part of the planning and control of IT. In seven cases, all personnel of the IT department record their time. This time registration is used as input in pricing or charging models. Often the project administration is separated from the normal financial administration. This is due to the incompatibilities in feedback time and depreciation periods. Cases 2 and 5 are the only cases that succeed in aligning the different financial and IT administrations. In these cases, the level of automation of the administrative systems is also high. This automation and alignment of the different administrations seems to be necessary to manage the complexity of ABC based administrations (Fig. 8).

11. Analysis of case studies

From the case studies it can be concluded that IT cost management is currently going through a phase of major changes, i.e. all organisations are busy making significant improvements. Most noticeable conclusions from the case studies are that:

- A lack of historic data and experience with IT makes it difficult to pre-calculate costs for budgeting and investment evaluation purposes.

Case:	1	2	3	4	5	6	7	8	9	10
Charge costs to clients	+	+	+	+	+	+		+	+	+
Charge actual costs				+	+	+				+
(Want to) charge per system		+		+	+			+		
Monthly billing		+	+	+	+				+	

Fig. 7. Overview of charging of IT costs in case studies.

Case:	1	2	3	4	5	6	7	8	9	10
Time registration	+	+	+	+	+		+			+
Separate project administration				+	+	+	+	+		
Configuration management		+			+					
Alignment of administrations		+			+					

Fig. 8. Overview of administration in case studies.

- User departments indicate that they are unable to relate the costs of IT that they are charged with, to their business processes. Therefore, the evaluation whether the costs of operational IT are worthwhile, is also difficult.
- In seven cases the IT departments use traditional book-keeping and budget procedures to control costs. Their financial administration does not provide them the adequate management information to control the costs of IT.
- In three cases the IT departments use more advanced accounting models. These models share the similar feature that they are able to incorporate the business processes (internal processes) of the IT department into the model. This gives a better insight into the specific characteristics of both IT projects and IT operations and the costs involved.
- The level of automation and alignment of the different administrative systems seems to be a critical success factor when using advanced cost models.

Given the first three points, we may conclude that in the majority of case organisations there is hardly a structured control of IT costs against benefits. Costs and benefits of projects are planned for, however, not evaluated afterwards. Costs of projects are controlled to the extent that these should stay within budget. Costs of operational information systems are hardly ever evaluated (planned or controlled) against benefits.

The control mechanism that does take place is the external benchmarking. Through benchmarking the organisation

is informed that they are spending approximately equivalent amounts as their competitors (who exploit similar control mechanism for their IT costs and benefits).

To be able to control the costs of IT, there is a need for adequate management information. Cost models have to provide the information needed to perform the different cost management activities. Therefore, insight is needed into the costs of different IT objects, i.e. operational systems, projects, internal processes and IT services, over different periods of time. Most case organisations do not have this insight. They either do not have a cost administration in which these IT objects can be identified or the information on these IT objects is administered over several different administrations.

These particular administrative systems need to be aligned. To accomplish this, a common structure for data exchange and management reporting is required. The ABC model provides such a structure (Kaplan & Cooper, 1998). This general model can be enhanced with IT specific elements, to ensure that the different IT objects and their costs can be identified. This integrated administrative system can be used to monitor and control the current projects and operational systems. The collected data can be used as historic data in future estimations.

IT cost management appears to enter a new Nolan-like development stage (Nolan, 1974). The subsequent stages can be characterised in terms of the capability maturity level (Paulk, Curtiss, Chrisses, & Weber, 1993). A *defined level* of cost management is slowly being entered and an *initial ad hoc* level is left. The table in Fig. 9 shows this change on the basis of four characteristics.

Characteristics	Ad hoc	Defined
<i>Planning</i>	Project based, justification often of initial investment only	Both for projects and operational systems. Life cycle costs are applied in justification of projects.
<i>Control</i>	External, based on overall benchmark of the IT organisation compared to competitors.	Internal, based on close monitoring of projects and operational systems, and analysis of completed projects.
<i>Administration</i>	Several separate administrations for IT and financial information	Integrated financial accounting system, based on ABC, including IT specific elements.
<i>IT cost charging</i>	Technical, based on IT components.	Functional, based on business activities.

Fig. 9. Characteristics of the initial and defined stage of IT cost management.

12. Summary and conclusions

In this paper an overview of IT cost management theory and practice is given. The theoretical approach is primarily based on the cost of ownership models. IT cost management in practice is studied through case studies at the IT departments of 10 major financial services companies.

From the theoretical study it can be concluded that existing cost of ownership models:

- Provide insight into the IT costs of *a single object* (information system or organisational-unit).
- Are applicable in TCO assessments and benchmarking.
- Do not support other cost management activities (i.e. budgeting, controlling project costs, controlling operational systems costs, and charging). These activities require insight in either the distribution of the costs over several objects or on a more continuous basis.

From the 10 case studies it can be concluded that:

- A lack of historic data and experience with IT makes it difficult to pre-calculate costs for budgeting and investment evaluation purposes.
- User departments indicate that they are unable to relate the costs of IT that they are charged with, to their business processes. Therefore, the evaluation whether the costs of operational IT is worthwhile, is also difficult.
- In seven cases the IT departments use traditional bookkeeping and budget procedures to control costs. Their financial administration does not provide them the adequate management information to control the costs of IT.
- In three cases the IT departments use more advanced accounting models. These models share the similar feature that they are able to incorporate the business processes (internal processes) of the IT department into the model. This gives a better insight into the specific characteristics of both IT projects and IT operations and the costs involved.

- The level of automation and alignment of the different administrative systems seems to be a critical success factor when using advanced cost models.

Overall it is concluded that IT cost management is currently entering a new Nolan-like development stage. Traditional bookkeeping is experienced as being inadequate and the ad hoc use of cost of ownership models or benchmarking are unable to provide adequate cost control. This new stage entails activity based costing-like accounting, enhanced with IT specific elements as a basis for an IT cost administration. This administration should provide adequate management information needed for all the different cost management activities, supporting a cost-effective management of IT costing.

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